

## **Mission Summary**

### **Hurricane Dennis IFEX Research Mission Summary 050710I Aircraft: N43RF**

#### **Scientific Crew:**

Lead Project Scientist	Michael Black
Radar Scientist	Michael Black
Workstation Scientist	Krystal Valde
Cloud Physics	Paul Willis
AXBT/SFMR Scientist	Eric Uhlhorn
Observers	Two staff members from Senator Shelby's office

#### **Aircraft Crew:**

Pilots	Randall TeBeest, Mark Nelson
Flight Engineers	Dewie Floyd
Navigators	Devin Brakob
Flight Director	Marty Mayeaux, Tom Shepherd,
Engineers	Terry Lynch

#### **Mission Brief:**

This mission was the first of two consecutive HRD landfall research missions designed to document intensity and structural changes associated with the interaction of Dennis with land. NOAA43 should arrive before the eyewall reaches the northern Gulf coast while NOAA42 would fly right after 43 leaves the area to document the changes in structure while Dennis was moving inland. Hurricane Dennis had rapidly intensified during the afternoon and night of July 4 from a Category 2 to Category 4 hurricane. The deepening ceased during the morning of 10 July but Dennis was forecast to be a major hurricane at landfall near Pensacola, Florida during the afternoon. In addition to sampling the highest winds in the eyewall, NOAA 43 would fly a combination of legs along the coast to gather important SFMR surface wind data near landfall and in support of research wind towers that were deployed by University colleagues at various coastal locations along Dennis's projected track. The aircraft would also attempt to release a series of dropsondes in high winds in a leg oriented perpendiculars to the coast and with spacing about 5 miles apart from about 25- 5 miles off the coast. The aircraft track would also take us over Buoys 42036 in the eastern Gulf and 42039 further to the NW, hopefully during the closest approach of the eyewall to Buoy 42039. GPS sondes and AXBTs would be released over the Buoys to compare with the observations collected on 43's flight the day before. The flight altitude would be 12,000 ft, takeoff and recovery would be in Jacksonville, Florida and we planned on dropping about 35 GPs sondes and 3 AXBTs.

**Mission Synopsis:**

Takeoff from Jacksonville was at 1501 UTC and NOAA43 headed westward for the Initial Point (IP) at Buoy 42036. At 1532 UTC the aircraft encountered a vigorous rainband just offshore from the west coast of Florida and about 175 nmi east of the center of Hurricane Dennis. We reached Buoy 42036 at 1553 UTC and released a GPs sonde and AXBT. The winds failed on the sonde and the AXBT recorded a SST of 28.5° C. The aircraft then headed NW toward Buoy 42039 which was reached at 1613 UTC. The buoy was located well outside of the eyewall and flight-level winds were about 60 kts while a GPS sonde and the SFMR recoded surface winds of about 50 kts. The AXBT released over the Buoy measured an SST of 26.5° C, about 2 degrees cooler than on the day before.

Leaving the buoy, NOAA43 continued NW and was in the eye at 1627 UTC. The eye was small (~ 10 nmi across) and filled mostly with cloud up to our flight-level of 12,000 ft. We continued toward the NW toward Louisiana and through the NW eyewall where the plane encountered a large, strong downdraft and a heavy graupel shower. Flight level winds were 120 kts in the SE eyewall and about 105 kt in the NW quadrant. NOAA43 flew over Buoys 42007 and 42040 at 1637 and 1657 UTC, respectively, releasing GPS sondes over them. From there, we headed east back to the eye at 1720 UTC. The western portion of the storm had unusual wind structure with GPS sondes and the SFMR reporting surface winds of 50-60 kts while the flight-level winds were only about 35 kt in the offshore flow.

In the east eyewall, maximum surface winds from a sonde measurement and from the SFMR were about 105 kts while maximum flight-level winds were 120 kts. A coastal run, starting about 20 miles offshore from near St. Marks, Florida and heading to the west just north of the eyewall and ending up NW of the center was performed from 1737 to 1809 UTC. Several GPs dropsondes were released at the approximate locations along the coast of the portable wind towers during this time.

N43 headed south for a short distance before entering the eye again from the SW at 1833 UTC. From the eye, we exited to the SE to set up a run perpendicular to the coast to drop 4 regularly spaced sondes in the high winds just outside the east eyewall. This perpendicular leg was from 1842 to 1847 UTC. At the coast, we turned SW through the NE eyewall and into the eye again at 1854 UTC.

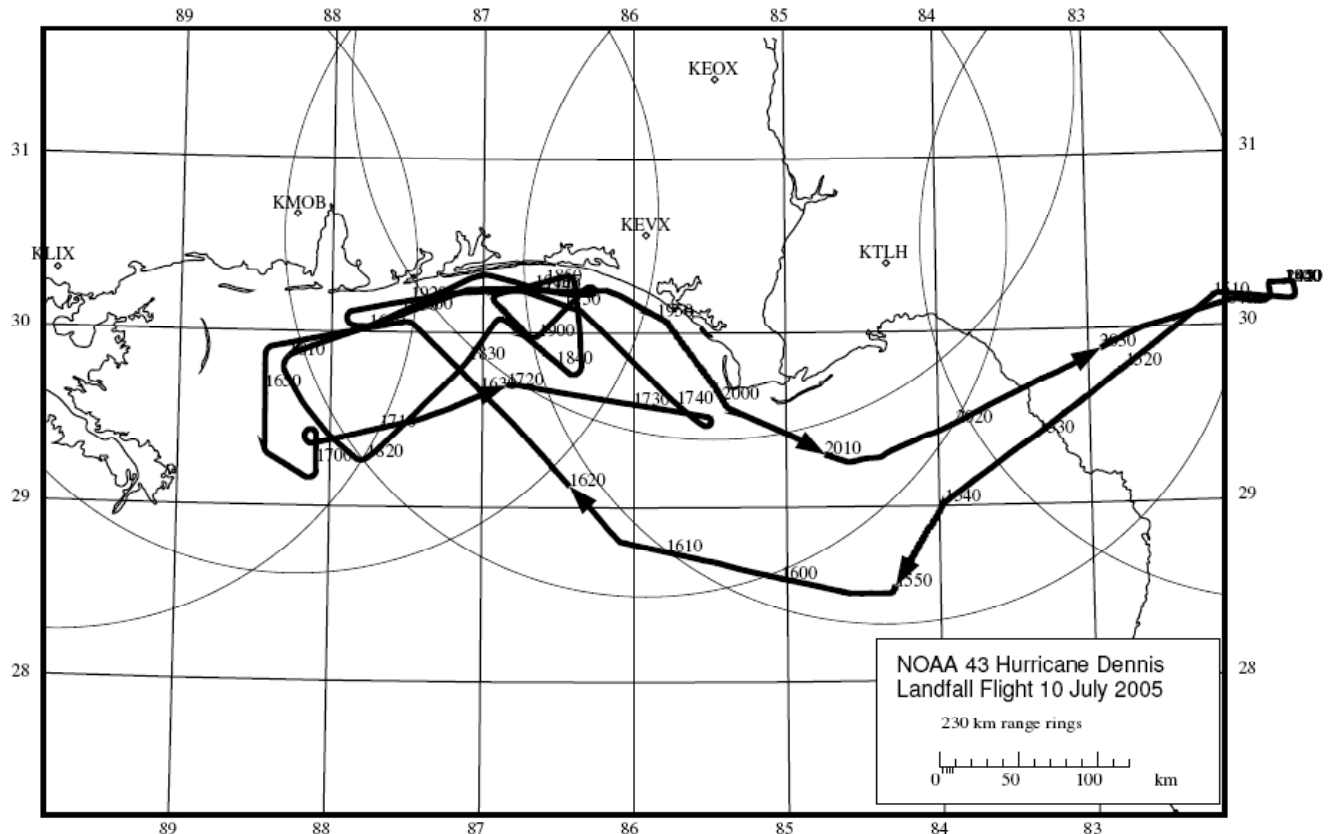
Our final coastal run was performed about 5 miles off of the shoreline very near the time the northern eyewall of Dennis was making landfall. Part of this coastal run was from east to west through the northern eyewall when N43 entered the eye a final time at 1914 UTC. The aircraft exited out to the SE and headed NE adjacent to the eyewall which was making landfall. At 1933 the plane headed east about 5 miles offshore and at 2000 UTC we ended our coastal run about 80 miles east of the center of landfalling Dennis and headed back to Jacksonville where we landed about 2100 UTC.

**Problems:**

A few of the sondes did not have launch detects (no data) and several more had intermittent winds. The radars system had to be reset once at 1705 UTC, resulting in a loss of data for a few minutes. The main data system worked well.

Michael Black

7/9/05



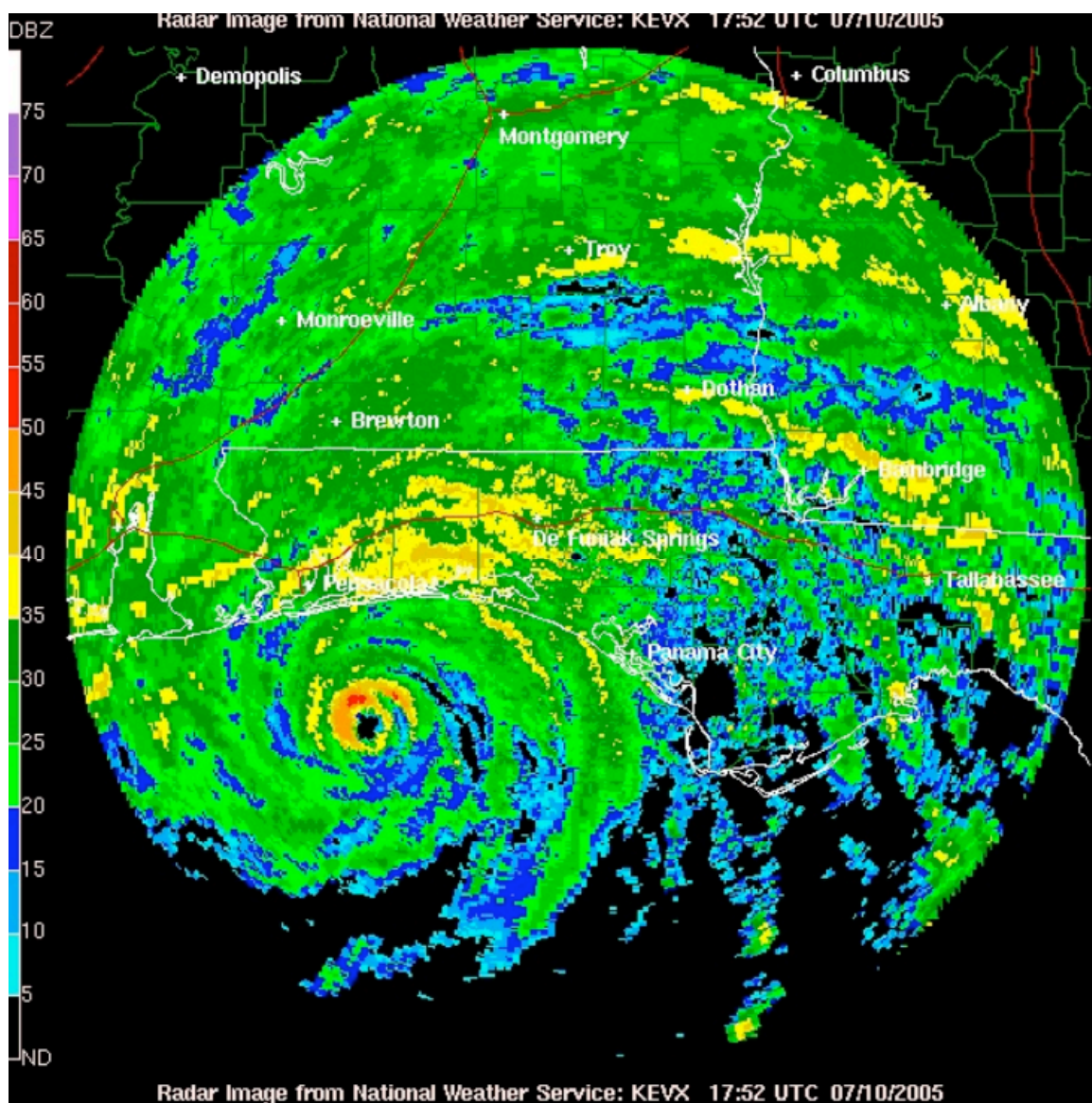


Fig. 2: WSR-88D radar image from KEVX at 1752 UTC prior to landfall.



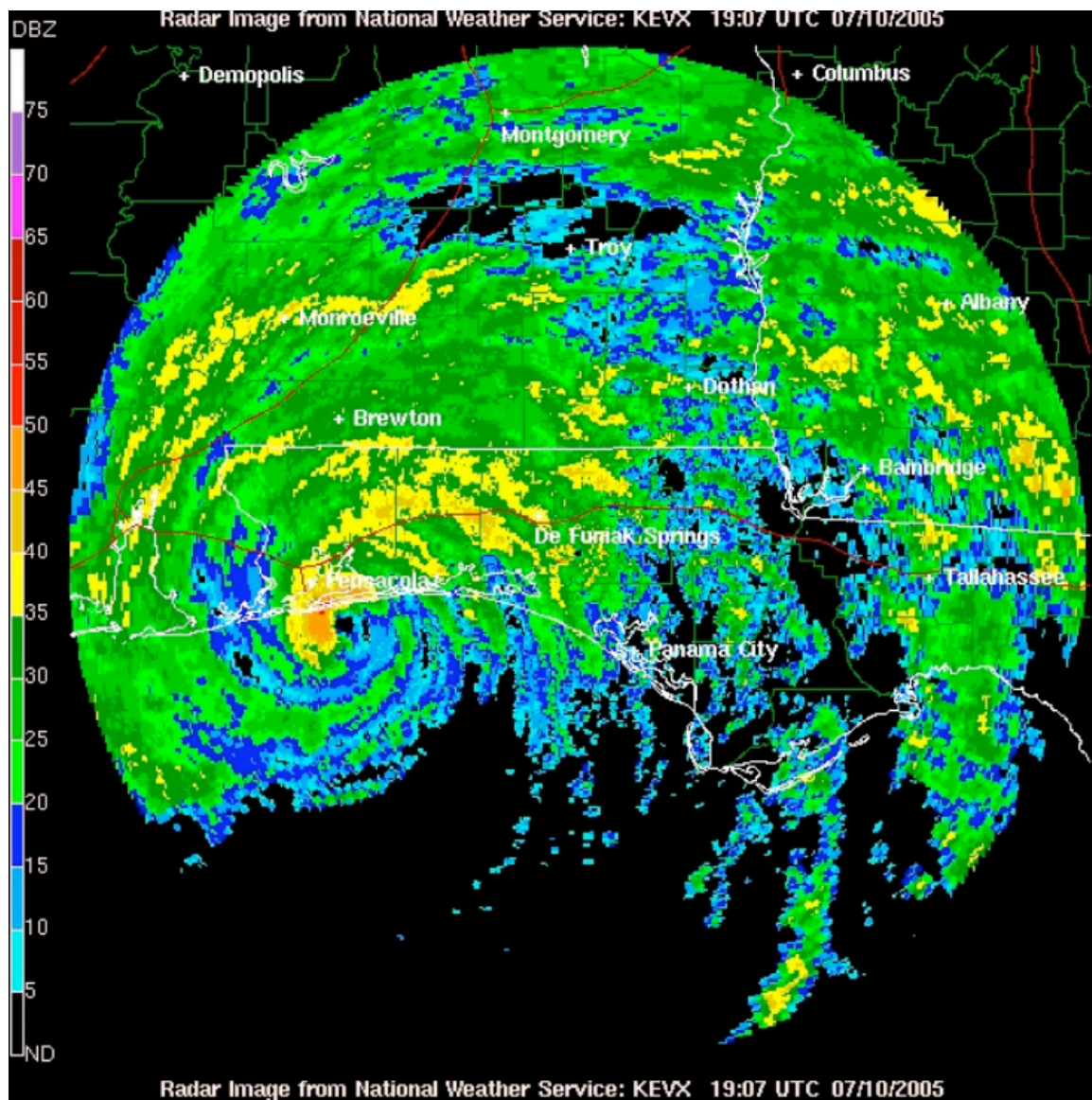


Fig. 3: WSR-88D radar image from KEVX at 1907 UTC (near landfall).

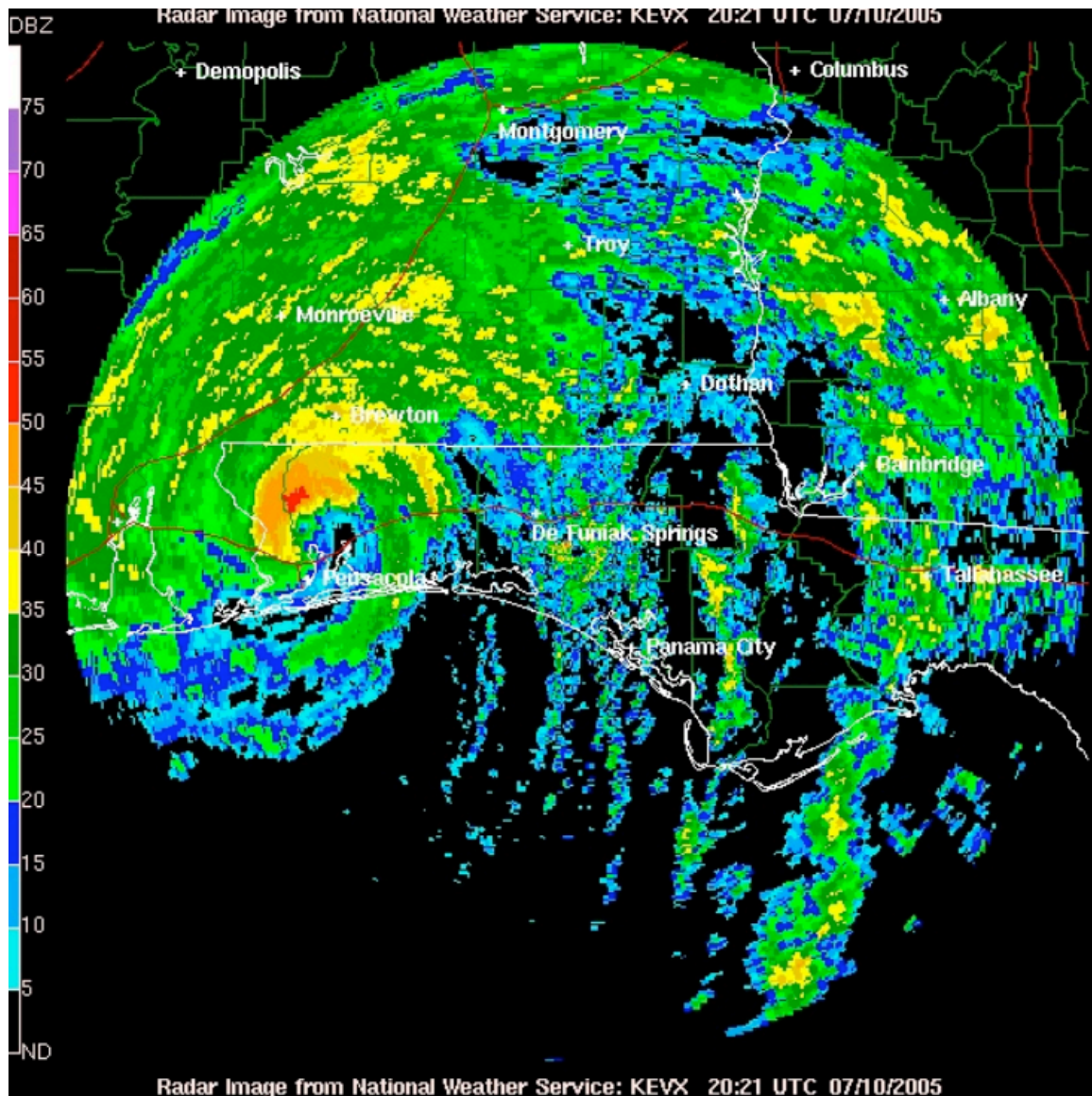
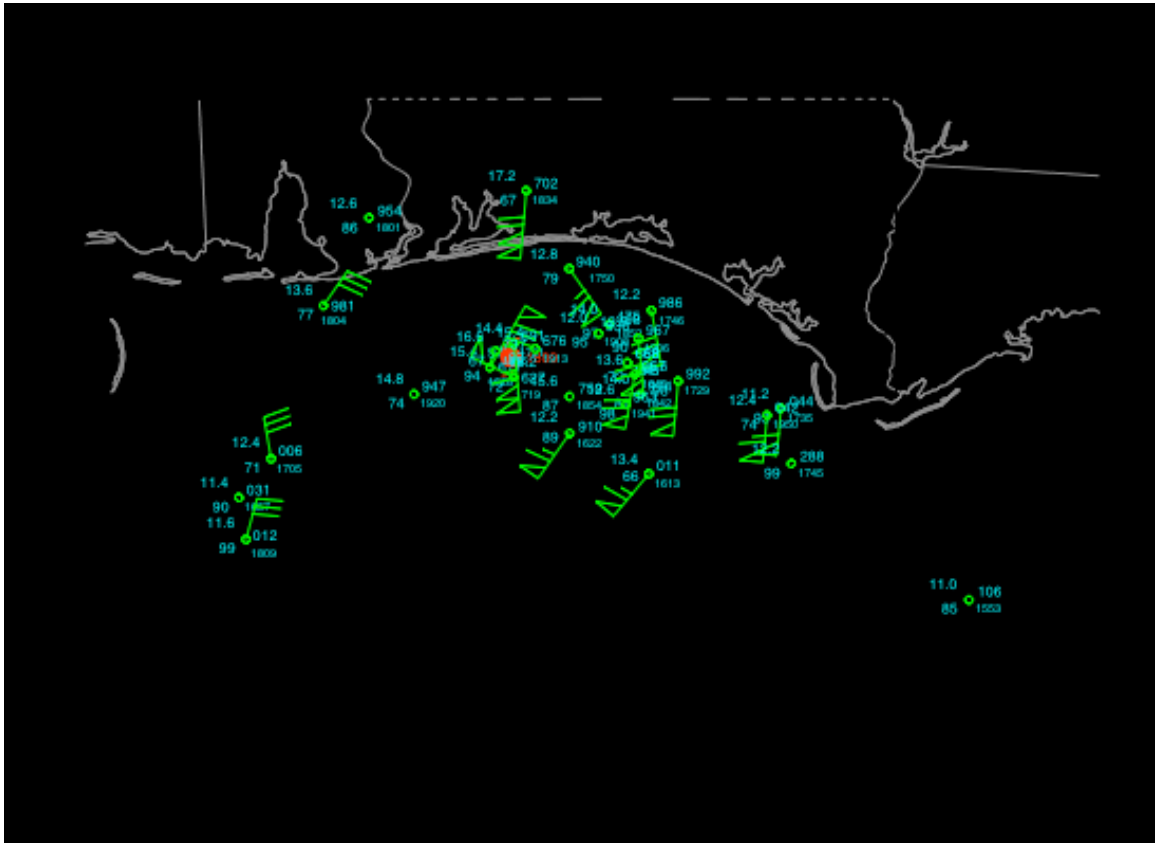


Fig. 4: WSR-88D radar image from KEVX at 1752 UTC (post landfall).



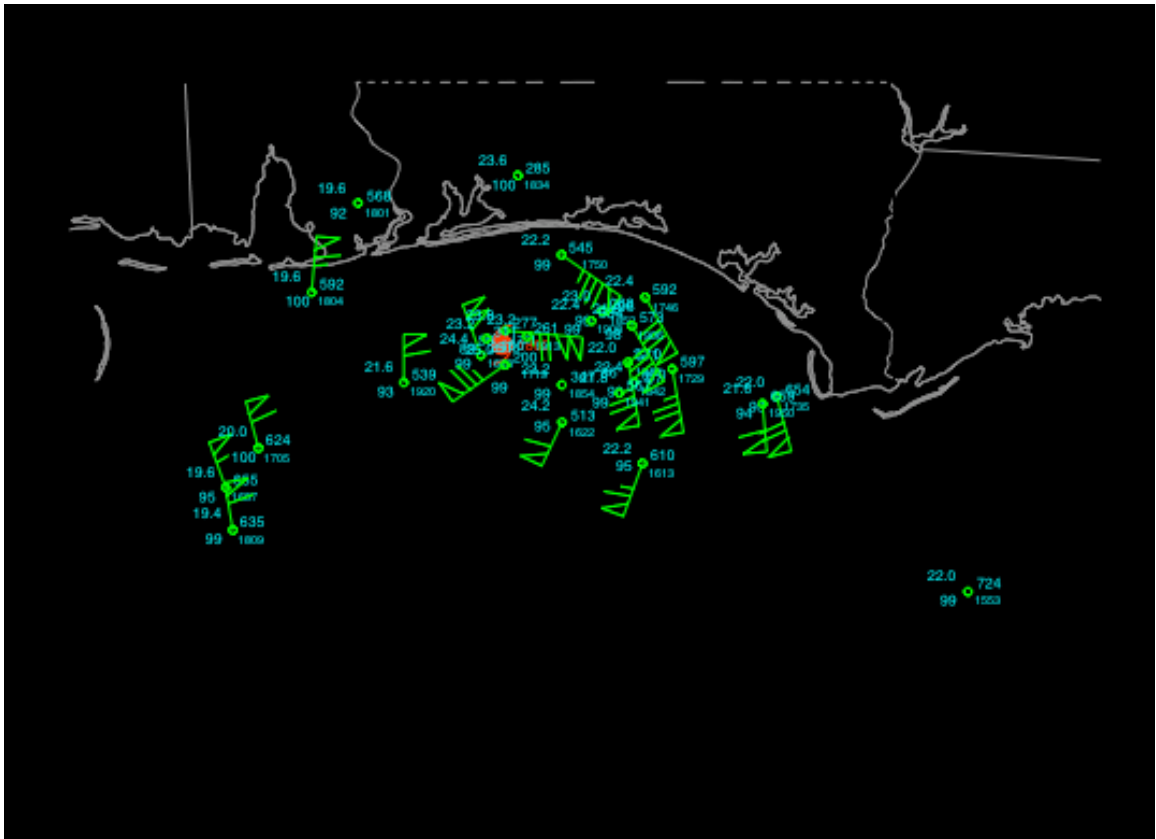


Fig. 6: GPS dropsonde observations at 925 mb.

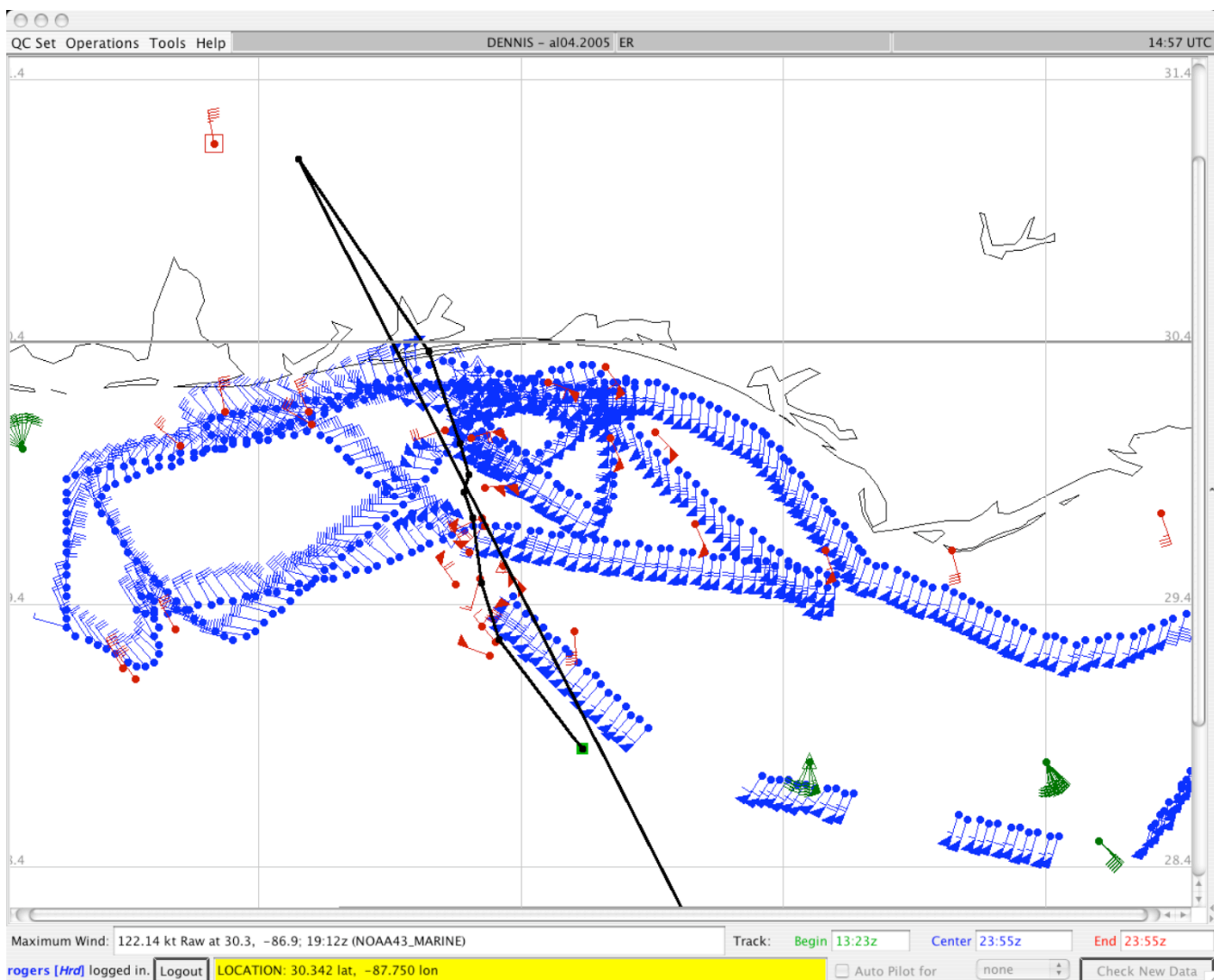


Fig. 7: Wind observations from flight level (blue), GPS sondes at 700 mb (red) and NOAA Buoys (green). The data are plotted in storm-relative coordinates from transmitted data using the HRD H\*WIND analyses.



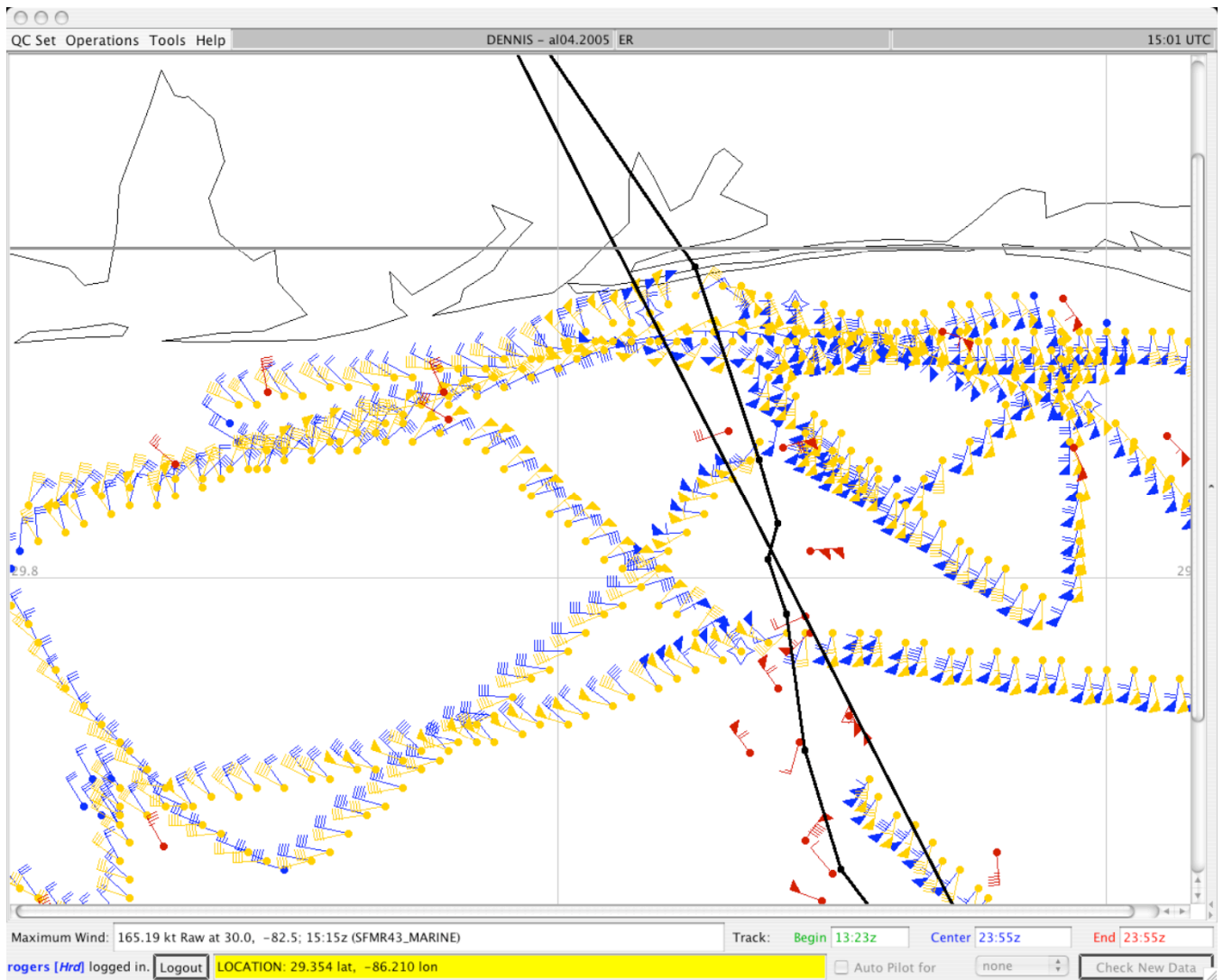


Fig. 8: Wind observations from flight level (blue), GPS sondes at 700 mb (red) and surface (SFMR, yellow). The data are plotted in storm-relative coordinates from transmitted data using the HRD H\*WIND analyses.



07/10/05 1200Z 04L DENNIS  
07/10/05 1437Z F-15 OVERPASS  
07/10/05 1315Z GOES-12 VIS

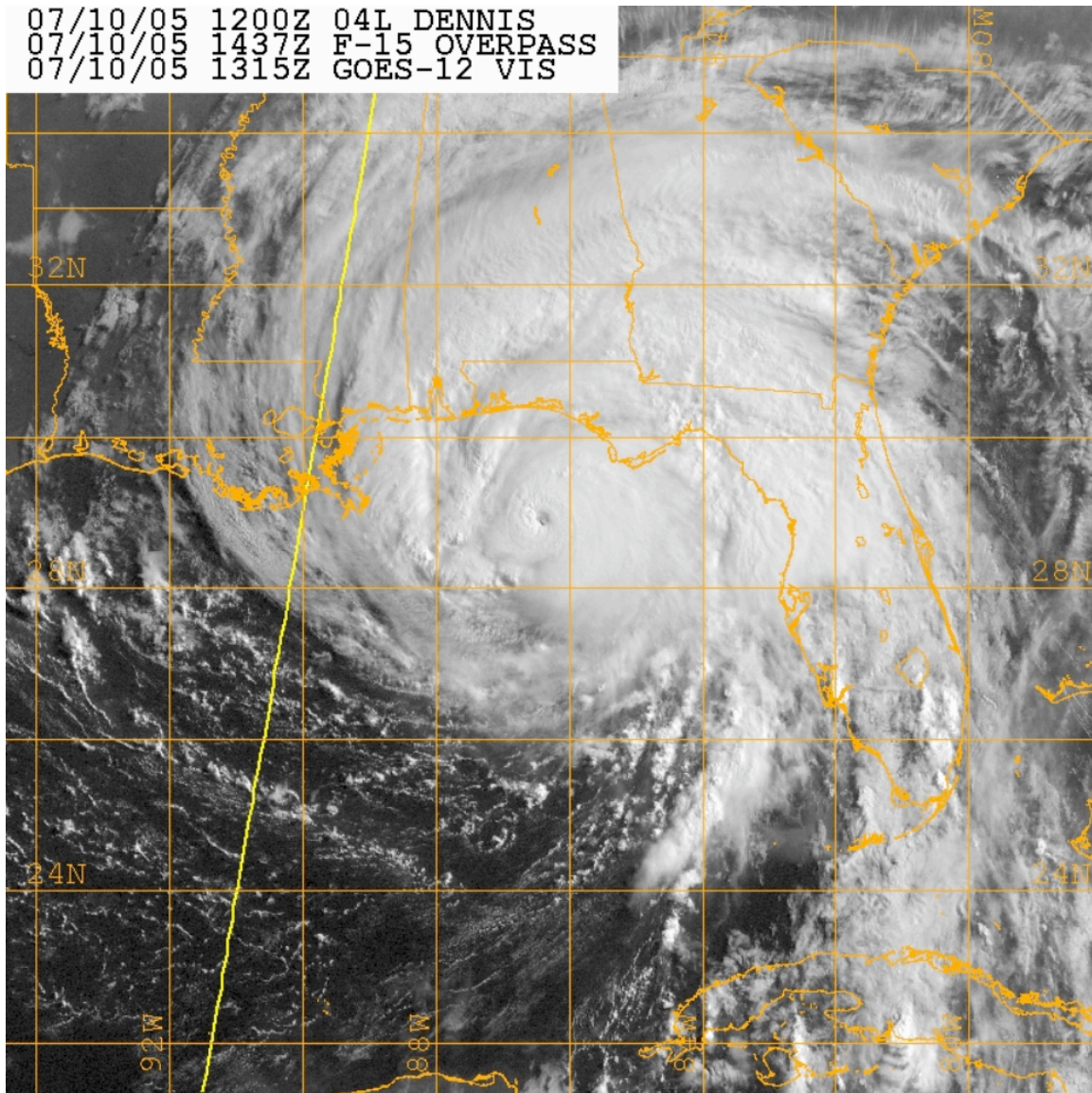


Fig. 9: Visible satellite imagery of Hurricane Dennis at 1315 UTC 10 July.

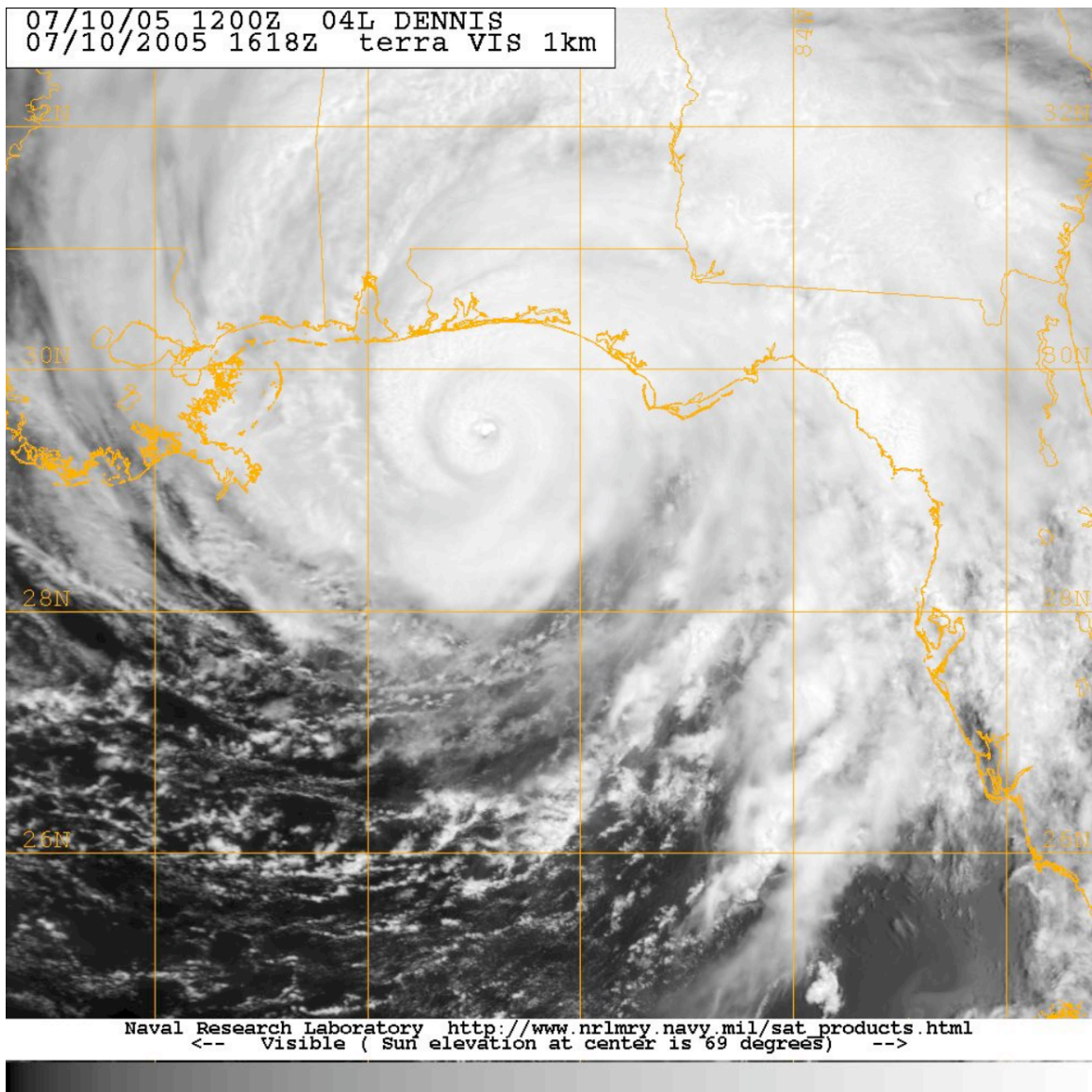


Fig. 10: High-resolution satellite imagery of Hurricane Dennis at 1618 UTC 10 July.

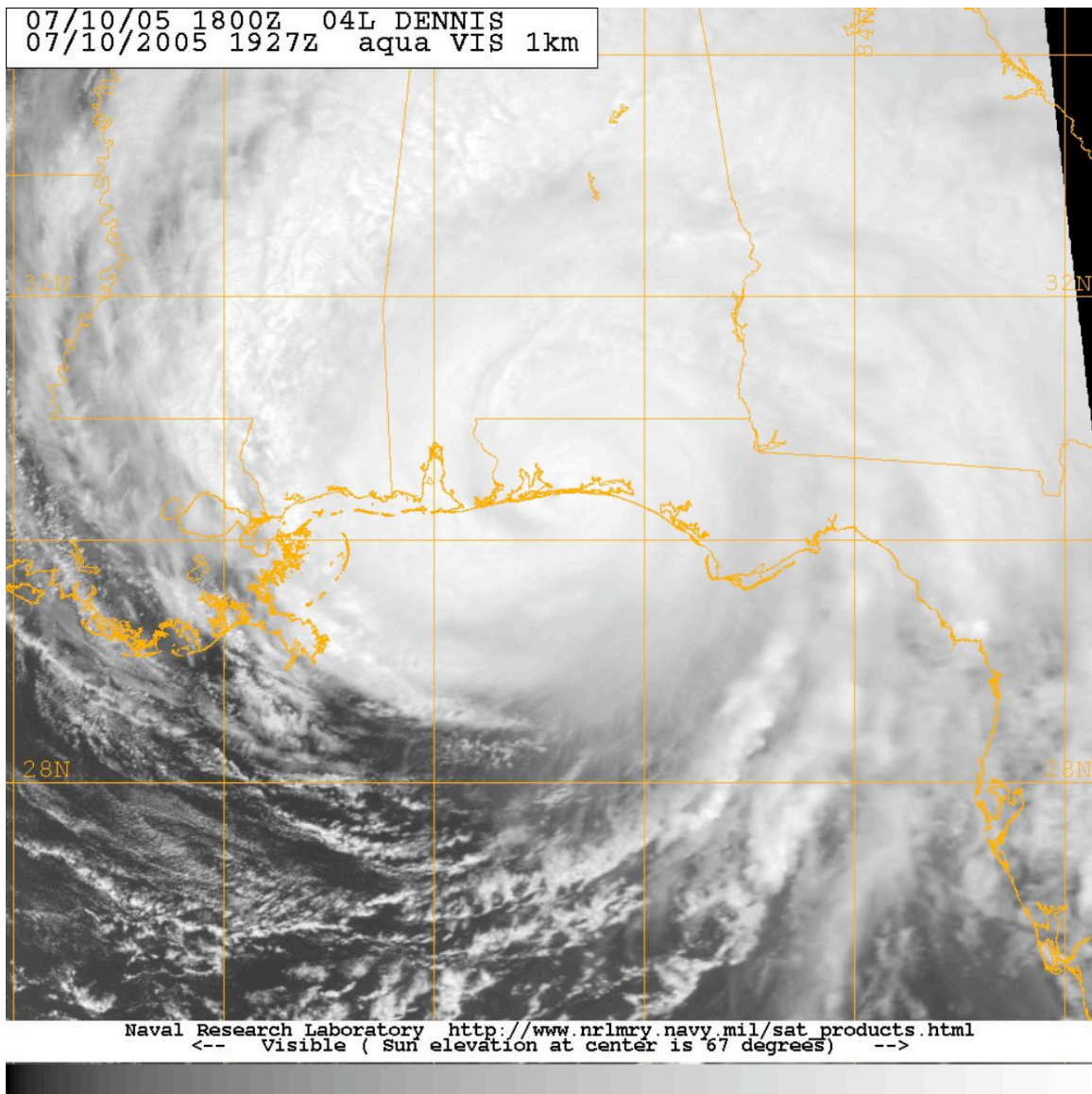


Fig. 11: High-resolution satellite imagery of Hurricane Dennis at 1927 UTC 10 July.